Remarks

In the final Office Action, the Examiner maintained the previous rejection of claim 27 under 35 U.S.C. § 101 and § 112. Additionally, the Examiner rejected claims 1-29 under 35 U.S.C. § 103(a). Regarding the rejections under 35 U.S.C. § 103(a), the Examiner rejected claims 1-5, 7-11, and 13 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,806,061 to Chaudhuri et al. ("Chaudhuri"), U.S. Patent No. 5,612,865 to Dasgupta ("Dasgupta"), U.S. Patent No. 6,134,532 to Lazarus et al. ("Lazarus"), and U.S. Patent No. 5,101,475 to Kaufman et al. ("Kaufman"); rejected claim 6 under 35 U.S.C. § 103(a) as being unpatentable over Chaudhuri, Dasgupta, Lazarus, and Kaufman, and further in view of U.S. Patent No. 6,349,296 to Broder et al. ("Broder"); rejected claim 12 under 35 U.S.C. § 103(a) as being unpatentable over Chaudhuri, Dasgupta, Lazarus, and Kaufman, and further in view of U.S. Patent No. 6,603,470 to Deering ("Deering"); rejected claims 14-16, 27, and 28 under 35 U.S.C. § 103(a) as being unpatentable over Chaudhuri, Dasgupta, and U.S. Patent No. 5,794,178 to Caid et al. ("Caid"); rejected claims 17-19 under 35 U.S.C. § 103(a) as being unpatentable over Chaudhuri, Dasgupta, and Caid, and further in view of Broder; rejected claim 20 under 35 U.S.C. § 103(a) as being unpatentable over Chaudhuri, Dasgupta, and Caid, and further in view of U.S. Patent No. 6,061,734 to London ("London"); rejected claim 21 under 35 U.S.C. § 103(a) as being unpatentable over Chaudhuri, Dasgupta, and Caid, and further in view of Deering; rejected claims 22, 23, and 26 under 35 U.S.C. § 103(a) as being unpatentable over Broder and U.S. Patent No. 5,469,354 to Hatakeyama et al. ("Hatakeyama"); rejected claims 24 and 25 under 35 U.S.C. § 103(a) as

being unpatentable over Broder and Hatakeyama, and further in view of Caid and Kisor; and rejected claim 29 under 35 U.S.C. § 103(a) as being unpatentable over Chaudhuri, Dasgupta, Caid, and Hatakeyama. The rejections of claims 1-13 under 35 § 103(a) are new rejections while the rejections of claims 14-29 under 35 § 103(a) are rejections maintained from the previous Office Action.

By this Amendment, Applicant proposes amending claim 27 to improve form. Claims 1-29 are currently pending.

Rejection of Claim 27 Under 35 U.S.C. §§ 101 and 112

As pointed out in the previous response, Applicant does not agree with the rejection of claim 27 under 35 U.S.C. §§ 101 and 112. However, in order to expedite prosecution, Applicant proposes amending claim 27 to recite that the system of claim 27 is implemented by one or more computer processing devices. The Examiner appears to indicate that the rejections of this claim under 35 U.S.C. §§ 101 and 112 would be obviated by such an amendment. (See final Office Action, pages 2 and 3). Accordingly, Applicant respectfully requests that these rejections of claim 27 be withdrawn.

Rejection of Claims 1-5, 7-11, and 13 Based on Chaudhuri, Dasgupta, Lazarus, and Kaufman

Claim 1 is directed to a computer-implemented method for generating a compact representation of a first object. The method includes a number of acts, including: (a) identifying a set of features corresponding to the first object; (b) generating for each feature a hashing vector having n coordinates; (c) summing

the hashing vectors to obtain a summed vector; and (d) creating an $n \bullet x$-bit representation of the summed vector by calculating an x-bit value for each coordinate of the summed vector, the $n \bullet x$-bit representation of the summed vector defining the compact representation of the first object.

Chaudhuri does not disclose many of the features recited in claim 1. The Examiner appears to concede as much, stating that Chaudhuri does not teach "the use of hashing vectors, the summing of vectors, and the use of n-bit representations." (final Office Action, page 3). These concepts relate to acts (b) through (d) in claim 1. Accordingly, the Examiner appears to contend that Chaudhuri discloses act (a) of claim 1 ("identifying a set of features corresponding to the first object"), and that Dasgupta, Lazarus, and Kaufman disclose the remaining features recited in claim 1. In particular, the Examiner relies on Dasgupta to generally disclose a hashing vector (final Office Action, page 3), relies on Lazarus to disclose summing vectors (final Office Action, page 4), and relies on Kaufman to disclose creating an "$n \bullet x$-bit representation" (final Office Action, page 5).

Chaudhuri is generally unrelated to the invention recited in claim 1. Chaudhuri describes a method of optimizing the cost of searches through a multimedia repository that contains objects that includes attributes such as color and text. (Chaudhuri, Abstract). In other words, Chaudhuri appears to be related to enabling searches on objects based on more than just the textual portion of the object. Chaudhuri, however, in no way discloses, suggests, or is related to the invention recited in claim 1. Chaudhuri does not mention the concept of a compact representation of an object, much less disclose or suggest the specific

technique recited in claim 1 for obtaining the recited $n \bullet x$-bit representation that defines the compact representation of the object.

Applicant concedes that the general concepts of hashing vectors, summing vectors, and otherwise manipulating vectors are known in the art. The Examiner appears to variously rely on Dasgupta, Lazarus, and Kaufman to disclose these general concepts. However, claim 1 recites more than abstract concepts relating to hashing vectors and vector summing. In particular, claim 1, recites, for example, generating for each feature a hashing vector having n coordinates; summing the hashing vectors to obtain a summed vector; and creating an $n \bullet x$-bit representation of the summed vector by calculating an x-bit value for each coordinate of the summed vector, the $n \bullet x$-bit representation of the summed vector defining the compact representation of the first object.

Although Dasgupta may be said to disclose a hashing method, Dasgupta does not disclose or suggest "generating for each feature a hashing vector having n coordinates." The Examiner points to column 10, lines 50-53 of Dasgupta as allegedly disclosing this feature of claim 1. This section of Dasgupta states: "Following a failure of Node 1, bucket 1 is reassigned to Node 2, and bucket 4 is reassigned to Node 3, i.e., the second coordinates in the hash vectors for buckets 1 and 4, respectively." Although this section of Dasgupta mentions "hash vectors," it in no way discloses or suggests generating for each feature a hashing vector having n coordinates, as recited in claim 1.

In rejecting claim 1, the Examiner states that it would have been obvious to combine Dasgupta with Chaudhuri "to use hashing vectors in order to organize the vectors into groups related to properties to these groups." (final Office

Action, page 3). Applicant submits that this motivation statement for combining Dasgupta and Chaudhuri is a conclusory statement not derived from either Dasgupta or Chaudhuri. Additionally, it is not clear to Applicant how "organizing the vectors into groups" relates to the instant feature of claim 1, i.e., generating a hashing vector having n coordinates for each feature.

The Examiner points to column 13, lines 6-9 of Lazarus as disclosing the feature of claim 1 of "summing the hashing vectors to obtain a summed vector." This section of Lazarus states: "At each update position, a correction vector is calculated and summed into an accumulated correction vector located in the data items 404 of the stem hash table 400 (shown in Fig. 4)." Thus, this section of Lazarus relates to calculating a correction vector. It is unclear to Applicant how this section of Lazarus could possible be construed to disclose or suggest summing of the hashing vectors recited in claim 1, which are generated as recited in the previous features of claim 1.

In applying Lazarus, the Examiner's stated motivation is that it would have been obvious "to combine Lazarus with Chaudhuri and Dasgupta to sum vectors in order to use a standard mathematical method of establishing relationships between vectors." (Office Action, page 4). Applicant submits that this motivation statement is conclusory and does make a proper *prima facie* case of obviousness. As previously mentioned, Applicant concedes that summing of vectors may be generally known in the art. This fact, however, would in no way disclose or suggest to one of ordinary skill in the art the specific features of claim 1 relating to summing the hashing vectors to obtain a summed vector.

The Examiner points to various portions of Kaufman as disclosing the last feature recited in claim 1. (final Office Action, page 5). Applicant has reviewed Kaufman, and submits that Kaufman in no way discloses or suggests "creating an $n \bullet x$-bit representation of the summed vector by calculating an x-bit value for each coordinate of the summed vector, the $n \bullet x$-bit representation of the summed vector defining the compact representation of the first object," as recited in claim 1.

More specifically, the Examiner points to column 3, lines 42-44; column 4, lines 21-27; column 27, lines 17-22; column 24, lines 21-27; and column 25, lines 29-34. These sections of Kaufman state:

> Each image-buffer is large enough to hold the largest projected image which can be created from its associated 64^3 sub-cube. (Kaufman, column 3, lines 42-44).
>
> Another prior art voxel-based graphics system serving as part of a solid modelling system, is disclosed in the publication "The Graphics PARCUM (Processing Architecture Based on Cubic Memory) System: A 3-D Memory Based Computer Architecture for Processing and Display of Solid Models" by D. Jackel, published in Computer Graphics Forum, Volume 4, Number 4, 1985 at pages 21-32. The cube of the PARCUM system is divided or partitioned into 64.sup.3 macro-voxels, each of which is regioning containing 4.sup.3 voxels, 1 byte for each voxel. The address for a voxel consists of the region address composed of x, y and z 4-bit sub-addresses, and a 6-bit voxel address. (Kaufman, column 4, lines 16-27).
>
> Retrieval of the retrieval rays of each Projection Ray Plane is carried out in a manner similar to that performed for arbitrary parallel projection, except that calculation of the "intersection point" and "pitch" of each Projection Ray Plane is carried out as specified in the program of FIG. 22. (Kaufman, column 27, lines 17-22).
>
> Preferably, each Deskewing Buffer Module 36 is realized by a conventional memory device with n storage cells, each cell being capable of holding a single voxel value of a predetermined bit-

> representation, common to all other voxel-storing devices used in realizing the components of the apparatus hereof. (Kaufman, column 24, lines 21-27).
>
> In step (2), the shifting of the beam (i.e voxel-based retrieval ray) is in effect demapped along one of the coordinate directions in Z.sup.3 space, and the amount of shift required to do so is based upon the 3-D skewed memory storage scheme utilized by the Cubic Frame Buffer 12. (Kaufman, column 25, lines 29-34).

Applicant submits that nothing in these sections of Kaufman, nor any other section of Kaufman, discloses creating a representation of a summed vector that defines a compact representation of an object, much less the specific technique for creating the representation of the summed vector recited in claim 1. Accordingly, even if Chaudhuri, Dasgupta, Lazarus, and Kaufman were combined as the Examiner suggests, the resulting method would still not include this feature of claim 1.

To summarize aspects of the the above arguments, Applicant respectfully points out that claim 1 recites four features labeled (a) through (d). For each feature, the Examiner cites a different reference as allegedly disclosing the feature. Applicant submits that the subject matter disclosed by each reference is at best, tenuously related to one another (for instance, each reference is classified in a different class/subclass – 714/14, 707/3, 364/184, and 345/425, respectively), and none of the four references are directed to the concept of generating a compact representation of an object as recited in claim 1. Applicant submits that it is unreasonable to contend that one of ordinary skill in the art, in possession of these four references, would somehow be motivated to combine features from each of the four references to obtain the computer-implemented

method for generating a compact representation of a first object, as is recited in claim 1.

In the Response to Arguments section of the final Office Action (page 22 and on), the Examiner contends, in support of the assertion that one of ordinary skill in the art would have found it obvious to combine Chaudhuri and the other cited references in the manner suggested by the Examiner, that Chaudhuri and the pending application are both related to the field of searches. (see final Office Action, paragraph 46 on pages 23 and 24). Chaudhuri is directed to a particularly technique for optimizing searches that includes calculating the cost to perform searches over various subconditions of a filter condition. (Chaudhuri, Abstract). According to Chaudhuri, the least costly subconditions are searched first. (Id.). In contrast to Chaudhuri, the system of claim 1 is directed to a computer-implemented method for generating a compact representation of an object. Although the compact representation of an object, as recited in claim 1, may be used in a search system, generating a compact representation of an object is not reasonably related to the techniques disclosed by Chaudhuri for optimizing searches.

In paragraph 47 of the final Office Action (page 24), the Examiner addresses the arguments of Applicant regarding Dasgupta. The Examiner states: "The 'generating for each feature' is taught by Dasgupta at col. 4, lines 26-28 and col. 1, lines 60-65 where the term 'piece' is used to suggest the term feature." The "feature" referred to by the Examiner refers to the term "feature" in, as recited in claim 1, "generating for each feature a hashing vector having n coordinates." The term "piece" is mentioned by Dasgupta at column 1, line 61,

and is used in the context "a piece of dedicated hardware." Applicant submits that a "feature" of an object, for which a hashing vector having n coordinates is generated, as recited in claim 1, is in noway related to the "piece of dedicated hardware" as described by Dasgupta.

In paragraph 51 (page 27) of the final Office Action, the Examiner states that "the term '$n \bullet x$-bit representation' is ambiguous." Applicant respectfully disagrees with the Examiner. It is well recognized in the art that the • symbol represents multiplication. Claim 1 additionally recites a hashing vector having "n" coordinates and "calculating an x-bit value." Claim 1 thus clearly recites creating a representation having a certain length (in bits), where the length is determined by multiplying n times x. For example, if the hashing vector had three coordinates and the x-bit value was an 8 bit value, the $n \bullet x$-bit representation would be a 24-bit representation.

For at least these reasons, Applicant submits that Chaudhuri, Dasgupta, Lazarus, and Kaufman, either alone or in combination, do not disclose or suggest each feature of claim 1. Additionally, the Examiner is impermissibly using hindsight gleaned from Applicant's specification to combine Chaudhuri, Dasgupta, Lazarus, and Kaufman. Accordingly, the Examiner has failed to make a *prima facie* case of obviousness with regard to claim 1. The rejection of claim 1 under 35 U.S.C. § 103(a) is improper and should be withdrawn.

Dependent claims 2-5, 7-11, and 13 were also rejected under 35 U.S.C. § 103(a) based on Chaudhuri, Dasgupta, Lazarus, and Kaufman. The rejection of these claims should be withdrawn at least by virtue of their dependency from claim 1.

Rejection of Claim 6 Based on Chaudhuri, Dasgupta, Kisor, Kaufman, and Broder

Claim 6 depends from claim 1 and recites that the object is a summary of another object. In rejecting claim 6, the Examiner, in addition to citing Chaudhuri, Dasgupta, Lazarus, and Kaufman, additionally relies on Broder. Specifically, the Examiner points to column 2, lines 45-47 of Broder (final Office Action, page 8) which relates to sketches of data objects, and states that it would have been obvious to combine the teachings of Broder "in order to use a reduced representation of a document to facilitate comparison with other reduced representations." Applicant submits that this rationale for combining the teachings of Broder with those of Chaudhuri, Dasgupta, Lazarus, and Kaufman, is improper and does not make a *prima facie* case of obviousness. The Examiner is simply repeating an advantage of a document sketch discussed by Broder, but does not provide any motivation why one of ordinary skill in the art would modify Broder in view of Chaudhuri, Dasgupta, Lazarus, and Kaufman to obtain the invention recited in claim 6.

In paragraph 54 of the final Office Action (page 29), the Examiner additionally points to column 9, lines 31-32 of Broder as teaching "the use of compact representations." Column 9, lines 31 and 32 of Broder state: "From the list 702 in step 720, it is possible to generate a third list 703 that identifies pairs of documents that share at least one feature." This section of Broder does not relate to "the use of compact representations" as the Examiner contends. If the Examiner continues this rejection, Applicant requests clarification on how the

Examiner is interpreting this section of Broder to teach "the use of compact representations."

Additionally, Applicant submits that Broder does not cure the above-mentioned deficiencies of Chaudhuri, Dasgupta, Lazarus, and Kaufman with respect to claim 1.

Accordingly, for at least these reasons, the rejection of claim 6 is improper and should be withdrawn.

Rejection of Claim 12 Based on Chaudhuri, Dasgupta, Lazarus, Kaufman, and Deering

Claim 12 depends from claim 11 and recites compressing the objects by group. In addition to Chaudhuri, Dasgupta, Lazarus, and Kaufman, the Examiner relies on Deering in rejecting claim 12. The Applicant has reviewed Deering, and submits that Deering does not cure the above-mentioned deficiencies of Chaudhuri, Dasgupta, Lazarus, and Kaufman with respect to claim 11. Accordingly, the rejection of claim 12 is improper and should be withdrawn.

Rejection of Claims 14-16, 27, and 28 Based on Chaudhuri, Dasgupta, and Caid

Claim 14 is directed to a computer-implemented method for generating a compact representation of an object. The method includes generating a vector corresponding to the object, each coordinate of the vector being associated with a corresponding weight; multiplying the weight associated with each coordinate in the vector by a corresponding hashing vector to generate a product vector; summing the product vectors to obtain a summed product vector; and generating a compact representation of the object using the summed product vectors.

As with claim 1, the Examiner concedes that Chaudhuri does not disclose many of the features recited in claim 14. Specifically, the Examiner states that Chaudhuri does not "teach the use of hashing vectors with associated coordinates, the use of compact representations, and the use of summed product vectors." (Office Action, page 10). The Examiner relies on Dasgupta and Caid to disclose these features of claim 14.

As previously mentioned, Dasgupta generally discloses a hashing technique. Claim 14, however, recites more than simply hashing data. In particular, claim 14 recites "multiplying the weight associated with each coordinate in the vector by a corresponding hashing vector to generate a product vector." Dasgupta does not disclose or suggest this feature of claim 14. The Examiner points to column 10, lines 50-53 of Dasgupta as allegedly disclosing this feature of claim 14. This section of Dasgupta was quoted above. Although this section of Dasgupta generally mentioned "hash vectors," it in no way discloses or suggests multiplying each coordinate in a vector by a corresponding hashing vector, much less doing so with a vector such as that recited in claim 14. For at least this reason, Dasgupta, even if combined with Chaudhuri as the Examiner suggests, still does not disclose or suggest each feature of claim 14.

In paragraph 56 of the Office Action (page 30), the Examiner responds that "multiplying the weight associated with each coordinate in the vector by a corresponding hashing vector to generate a product vector," as recited in claim 14, is disclosed by the combination of Caid and Dasgupta in which Caid discloses "multiplying the weight" and Dasgupta discloses "associated with each coordinate in the vector by a corresponding hashing vector to generate a product

vector." Applicant submits that the Examiner is once again improperly combining multiple references that allegedly disclose isolated features or terms from the claims in an attempt to reconstruct Applicant's invention.

The Examiner further states that it would have been obvious to combine Dasgupta with Chaudhuri "to use hashing vectors in order to organize the vectors into groups related to properties to these groups." (Office Action, page 10). Applicant submits that this motivation statement for combining Dasgupta and Chaudhuri is a conclusory statement not derived from either Dasgupta or Chaudhuri. Additionally, it is not clear to Applicant how "organizing the vectors into groups" relates to the instant feature of claim 14, i.e., multiplying the weight associated with each coordinate in the vector by a corresponding hashing vector to generate a product vector.

In paragraph 57 (page 31 of the final Office Action), the Examiner contends that Dasgupta's use of "buckets" in some way provides support for the Examiner's stated motivation for combining Dasgupta and Chaudhuri. Although buckets are a known technique for organizing hash results, Applicant submits that this disclosure by Dasgupta would not provide one of ordinary skill in the art with motivation to combine Dasgupta and Chaudhuri to obtain the invention recited in claim 14. Claim 14 does not recite the use of hash buckets.

Claim 14 further recites summing the product vectors to obtain a summed product vector and generating a compact representation of the object using the summed product vectors. The Examiner relies on Caid to allegedly disclose this feature of claim 14.

Caid is directed to the visualization of information using graphical representations of context vector based relationships and attributes. (Caid, Title). The context vectors of Caid are said to represent conceptual relationships among information items by quantitative means. (Caid, Abstract).

The Examiner points to a number of sections of Caid as allegedly disclosing features of claim 14. (See Office Action, pages 10 and 11). Applicant submits that none of the pointed-to sections of Caid disclose or suggest the features of claim 14. The Examiner appears to be picking and choosing isolated sections of Caid and applying these sections to isolated phrases within claim 14 without considering claim 14 as a whole. This is not a proper rejection under 35 U.S.C. § 103(a).

More specifically, the Examiner points to column 14, line 23 and column 14, lines 40-43 of Caid as disclosing "generating a compact representation of the object," as recited in claim 14. Column 14, line 23 of Caid discloses generating "a relatively compact display." This compact display of Caid refers to using graphical icons to represent documents. (Caid, column 23, lines 10-22). Column 14, lines 40-43 of Caid also refers to the generation of visual objects. Applicant submits that using a graphical icon as a compact display is not consistent with claim 14 as a whole, in which a compact representation of an object is generated using summed product vectors that are generated according to the previous acts recited in claim 14.

The Examiner additionally points to column 12, lines 26-28 as disclosing "using the summed product vectors." This section of Caid generally discloses taking a dot product of "summary vectors with the query vector." Again,

Applicant submits that the Examiner appears to be picking and choosing isolated sections of Caid and applying these sections to isolated phrases within claim 14 without considering claim 14 as a whole. Applicant concedes that the general concept of vectors and vector operations are known in the art. However, claim 14 recites more than simply using vectors, instead claim 14 recites a combination of features including summing product vectors to obtain a summed product vector. Caid in no way discloses or suggests this feature of claim 14.

In paragraph 58 (page 32 of the final Office Action), the Examiner states: "A compact display of an object is clearly a compact visual representation of an object. This claim does not exclude visual representations." Applicant submits that while claim 14 does not explicitly exclude a "compact visual representation of an object," Applicant reiterates that a graphical icon as a compact display is not consistent with claim 14 as a whole, in which a compact representation of an object is generated using summed product vectors that are generated according to the previous acts recited in claim 14. Accordingly, although Caid may disclose a compact visual representation of an object, this in no way suggests the features of claim 14.

For at least these reasons, Applicant submits that Chaudhuri, Dasgupta, and Caid do not disclose or suggest each feature recited in claim 14.

Additionally, Applicant submits that the Examiner has not made a proper *prima facie* case of obviousness based on Chaudhuri, Dasgupta, and Caid. For example, as motivation for combining Caid with Chaudhuri and Dasgupta, the Examiner states "to use summed product vectors and compact representations in order to determine the characteristics that are most representative of the objects

and to reduce the amount of memory required by the representations of these objects." (final Office Action, page 12). Applicant submits that this motivation for combining Chaudhuri, Dasgupta, and Caid is conclusory and provides no logical explanation for why one of ordinary skill in the art would combine Dasgupta, Chaudhuri, and Dasgupta as the Examiner suggests.

Accordingly, Applicant submits that the rejection of claim 14 is improper and should be withdrawn. Claims 15 and 16 depend from claim 14. For at least this reason, the rejection of claims 15 and 16 should also be withdrawn.

Claims 27 and 28 include features similar to those recited in claim 14. Accordingly, based on the rationale given above relating to claim 14, Applicant submits the rejection of claims 27 and 28 is improper and should also be withdrawn.

Rejection of Claims 17-19 Based on Chaudhuri, Dasgupta, Caid, and Broder

Claims 17-19 are dependent claims that further define the features of claim 14. The Examiner additionally relies on Broder in rejecting these claims. (final Office Action, page 11). Applicant submits that Broder does not cure the above-mentioned deficiencies of claim 14. For at least this reason, the rejection of claims 17-19 should be withdrawn.

*Rejection of Claim 20 Based on Chaudhuri, Dasgupta, Caid, and Londo*n

Claim 20 is a dependent claim that further defines the features of claim 14. The Examiner additionally relies on London in rejecting this claim. (Office Action,

page 13). Applicant submits that London does not cure the above-mentioned deficiencies of claim 14. For at least this reason, the rejection of claim 20 should be withdrawn. Additionally, claim 20 includes additional features not disclosed or suggested by Chaudhuri, Dasgupta, Caid, or London, either alone or in combination.

Claim 20 recites "wherein values in the hashing vectors are generated using a pseudo random number generator seeded based on the coordinate corresponding to the hashing vector." It appears that the Examiner is relying on separate portions of three different references (Caid, Dasgupta, and London) to disclose the recitations of claim 20. (final Office Action, pages 13 and 14). Again, Applicant reiterates that instead of analyzing the claim as a whole, the Examiner is performing a piecemeal analysis of claim 20. In the instant case, not only is the Examiner not analyzing the claim as a whole, the Examiner is not even analyzing a single feature or act of the claim as a whole.

Although London discloses using a hash function to generate a pseudo-random number, (London, column 5, lines 32-36), this does not disclose or suggest the recitations of claim 20, i.e., "wherein values in the hashing vectors are generated using a pseudo random number generator seeded based on the coordinate corresponding to the hashing vector." Using the output value of a hash function as a pseudo-random number as disclosed by London does not disclose or suggest generating values in a hashing vector using a pseudo random number generator.

For at least these reasons, Applicant submits that London does not cure the deficiencies of Chaudhuri, Dasgupta, and Caid with regard to claim 20.

Accordingly, Chaudhuri, Dasgupta, Caid, and London, either alone or in combination, do not disclose or suggest each element of claim 20. Additionally, Applicant submits that the Examiner has not made a proper *prima facie* case of obviousness with regard to claim 20. For this reason also, the rejection of claim 20 is improper and should be withdrawn.

Rejection of Claim 21 Based on
Chaudhuri, Dasgupta, Caid, and Deering

Claim 21 is a dependent claim that further defines the features of claim 14. The Examiner additionally relies on Deering in rejecting claim 21. (final Office Action, page 14). Applicant submits that Deering does not cure the above-mentioned deficiencies of claim 14. For at least this reason, the rejection of claim 21 should be withdrawn.

Rejection of Claims 22, 23, and 26 Based on
Broder and Hatakeyama

Claim 22 is directed to a computer-implemented method comprising creating a similarity sketch for each of first and second objects based on an application of a hashing function to a vector representation of the first and second objects; comparing, on a bit-by-bit basis, the similarity sketches for the first and second objects; and generating a value defining the similarity between the first and second objects based on a correspondence in the bit-by-bit comparison.

In rejecting claim 22, the Examiner states the Broder discloses creating a similarity sketch for each of first and second objects, but concedes that Broder does not create a similarity sketch in the manner recited in claim 22. (final Office

Action, page 15). More specifically, the Examiner concedes that Broder does not teach the use of hashing functions to create the similarity sketch. (final Office Action, page 15). The Examiner relies on Hatakeyama to disclose hashing functions.

The Examiner particularly points to column 21, lines 39-42 of Hatakeyama to disclose hashing functions. This section of Hatakeyama, and surrounding sections of Hatakeyama, state:

> In order to decrease the capacity of the component character table created according to the fourth embodiment, it is contemplated with the fifth embodiment of the invention to allocate a plurality of characters to a single entry ID number in the bit list. More specifically, there is adopted a method for establishing correspondences between the characters constituting the search term and the bit positions in the bit list by using a hash function. The hash function to this end may be expressed as follows.
>
> h (SCODE)=mod (SCODE, N) . . . (5-1)
>
> where "SCODE" represents a character code resulting from the transformation in accordance with the expression (4-1) mentioned hereinbefore, "mod" represents a function used for outputting a residue resulting from division of a first argument by a second argument, and "N" represents a given integer value. Assuming, for example, that "512" is used as the value of N, " " assumes the entry ID number of "480" with " " assuming the entry ID number of "118".

(Hatakeyama, column 21, lines 52). In summary, this section of Hatakeyama discloses using a hash function (5-1) to generate correspondences between characters of a search term and positions in a bit list. Hash function (5-1) of Hatakeyama, however, is not used by Hatakeyama to generate similarity sketches, and is certainly not used by Hatakeyama in the specific manner recited in claim 22. That is, Hatakeyama does not disclose or suggest generating a

similarity sketch based on an application of a hashing function to a vector representation of the first and second objects, as recited in claim 22. Accordingly, Hatakeyama does not cure the admitted deficiency of Broder.

In paragraph 65 of the final Office Action (page 36), the Examiner contends that the claimed feature in claim 22 of generating a similarity sketch based on an application of a hashing function to a vector representation of the first and second objects, is disclosed by the combination of Broder and Hatakeyama. More specifically, the Examiner contends that Broder discloses "creating a similarity sketch" and Hatakeyama discloses "based on application of a hashing function." Again, Applicant asserts that the Examiner is performing an improper piece-meal analysis in which the Examiner is not even analyzing a single feature or act of the claim as a whole.

Additionally, Applicant submits that one of ordinary skill in the art would not be motivated to modify Broder to use the hashing function disclosed by Hatakeyama. Although Broder discloses specific techniques for calculating sketches, the sketches of Broder are not created in the manner in which the similarity sketches of claim 22 are created. Hatakeyama does not even mention a similarity sketch. Thus, one of ordinary skill in the art would not be motivated to modify Broder to use a different technique to calculate a similarity sketch, as Hatakeyama does not disclose any different technique. The Examiner is impermissibly using hindsight taken from Applicant's specification in modifying Broder as suggested.

For at least these reasons, Broder and Hatakeyama, either alone or in combination, fail to disclose or suggest the features of claim 22 and the rejection

of this claim should be withdrawn. The rejection of dependent claim 23 should also be withdrawn, at least by virtue of its dependency on claim 22.

Claim 26 was also rejected based on Broder and Hatakeyama. Claim 26 recites, among other things, a processor generating similarity sketches for each of a pair of objects based on application of a hashing function to vector representations of the objects. As discussed above regarding claim 22, Broder and Hatakeyama do not disclose or suggest any such feature. Accordingly, the rejection of claim 26 under 35 U.S.C. § 103(a) should also be withdrawn.

Rejection of Claims 24 and 25 Based on Broder, Hatakeyama, Caid, and Kisor

Claim 24 further defines the method of claim 22, and recites that creating the similarity sketch for each of the first and second objects further comprises generating a vector corresponding to the first and second objects, each coordinate of the vector being associated with a corresponding weight, multiplying the weight associated with each coordinate in the vector by a corresponding hashing vector to generate a product vector, summing the product vectors, and calculating a bit corresponding to each coordinate of the summed product vector.

The Examiner contends that Broder discloses generating a vector corresponding to the first and second objects but relies on Caid and Kisor to disclose the remaining features of claim 24. (Office Action, pages 16 and 17). Although Caid and Kisor may be said to generally disclose vector operations, neither Caid nor Kisor disclose creating similarity sketches for objects. Thus, one of ordinary skill in the art would not be motivated to modify Broder to calculate a

similarity sketch as recited in detail in claim 24. The Examiner is again performing a piecemeal analysis of claim 24 and is not considering the claim as a whole. Accordingly, the Examiner has not made a *prima facie* case of obviousness with regard to claim 24.

For at least these reasons, Applicant submits that the rejection of claim 24 under 35 U.S.C. § 103(a) is improper and should be withdrawn. The rejection of claim 25 should also be withdrawn, at least by virtue of its dependency on claim 24.

Rejection of Claim 29 Based on
Chaudhuri, Dasgupta, Caid, and Hatakeyama

Claim 29 is directed to a computer-implemented method for generating a compact representation of an object. The method includes generating an object vector corresponding to the object; generating a hashing vector corresponding to each coordinate of the object vector; summing the hashing vectors to obtain a summed vector; calculating at least one bit corresponding to each coordinate of the summed product vector; and generating a compact representation of the object by concatenating the calculated bits.

The Examiner contends that Chaudhuri discloses generating an object vector corresponding to the object, as recited in claim 29, but relies on Dasgupta, Caid, and Hatakeyama to disclose the remaining features of claim 29. Based on arguments similar to those given above, Applicant submits that the Examiner has not made a *prima facie* case of obviousness regarding claim 29. Specifically, although Dasgupta, Caid, and Hatakeyama may generally disclose hashing and vector operations, one of ordinary skill in the art would not be motivated to combine Chaudhuri, Dasgupta, Caid, and Hatakeyama as the Examiner

suggests. The Examiner is performing a piecemeal analysis of claim 29 by applying different references to isolated phrases in claim 29 without regard to the claim as a whole. Thus, the Examiner has not made a *prima facie* case for obviousness and the rejection should be withdrawn.

Conclusion

Applicant respectfully requests that this Amendment under 37 C.F.R. § 1.116 be entered by the Examiner, placing claims 1-29 in condition for allowance. Applicant submits that the proposed amendment of claim 27 does not raise new issues or necessitate the undertaking of any additional search of the art by the Examiner, since all of the elements and their relationships claimed were either earlier claimed or inherent in the claims as examined. Therefore, this Amendment should allow for immediate action by the Examiner.

Furthermore, Applicant respectfully points out that the final action by the Examiner presented some new arguments as to the application of the art against Applicant's invention. It is respectfully submitted that the entering of the Amendment would allow the Applicant to reply to the final rejections and place the application in condition for allowance.

Finally, Applicant submits that the entry of the amendment would place the application in better form for appeal, should the Examiner dispute the patentability of the pending claims.

In view of the foregoing remarks, Applicant submits that the claimed invention, as amended, is neither anticipated nor rendered obvious in view of the prior art references cited against this application. Applicant therefore requests

the entry of this Amendment, the Examiner's reconsideration and reexamination of the application, and the timely allowance of the pending claims.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 50-1070 and please credit any excess fees to such deposit account.

Respectfully submitted,

HARRITY & SNYDER, L.L.P.

By: 
Paul A. Harrity
Reg. No. 39,574

Date: October 27, 2005

11240 Waples Mill Road
Suite 300
Fairfax, Virginia 22030
Telephone: 571-432-0800
Facsimile: 571-432-0808